Specifically Statistics: Maximising the benefits of statistical learning in schools

Mathematics and Statistics are both core members of the STEM subjects and potent enablers of all the others. This document clarifies what is *distinctive* about *statistics* and its educational needs.

What distinguishes Statistics from the rest of "Mathematics and Statistics?"

"*Statistics is the science of learning from data and of measuring, controlling and communicating uncertainty*" (American Statistical Association). It has real data at its core, and its defining purpose is learning about the real world by collecting, analysing, and interpreting data. Anything else simply provides a means that may be useful for achieving those ends. Concerns about uncertainty and data variation lead to distinctive thought processes.

How Statistics is changing

While the most fundamental, underpinning concepts of statistics are unchanging, the means by which we extract insights from data are changing rapidly as a result of digital technology – and technologically enabled advances, such as advances in data visualisation and data wrangling, are making its benefits accessible to a much wider cross-section of students and society. The nature and size of the data we have to deal with is changing rapidly too (e.g. the rise of big data), as is its increasing ubiquity.

Because of ongoing changes in the technologies people interact with and the automation of routine processes, *skills in thinking* with data, and *skills in communicating* the real-world lessons we learn from data, are becoming much more important (for almost everyone) than *skills in doing*.

How Statistics pedagogy is changing

The shifts from *doing* to *thinking* and *communicating*, and from "by-hand" construction to the routine use of digital technology, pose huge challenges: for teachers because they were themselves educated in the historical modes; and for a system that relies on changes being slow enough so that the majority of examiners, textbook writers, experienced teachers, etc. can be current.

What Statistics needs

Statistics education in New Zealand needs mechanisms for transmitting core learnings from very small numbers of specialists to the system as a whole. What it means to teach "thinking" and "communicating" about data, and arriving at understandings of how to go about that, are things that very small numbers of thinkers, researchers and lead teachers are developing, drawing on fundamental educational principles and real-world experience with data analysis. These learnings are not something that can just happen in Learning Communities, though these Communities should be a very useful downstream component of dissemination and professional development strategies.

What Statistics has

In New Zealand we have some of the best statistics education researchers in the world, the most forward-looking curriculum, many innovative and creative teachers, excellent relationships between stakeholders, excellent international connections, and a desire for continued progress.

Collaboration

The *Education Committee* of the *New Zealand Statistical Association* (NZSA) is very keen to work with any stakeholder who wishes to further improve New Zealand's statistical education system so that it gives a more valuable preparation for the future lives and careers of our students, and helps build a more data literate and capable society.

<div align="right">

Education Committee, New Zealand Statistical Association, 1 August 2016
(*To contact, email the Committee's Convenor: alasdair.noble@agresearch.co.nz*)

</div>